



Figure 1: Owens Logo.

Course Syllabus
Semester:
School of Nursing and Health Professions
Department of Sonography

<i>Course Name:</i>	Ultrasound Physics I
<i>Course & Section Number:</i>	DMS 101 – XXX
<i>Meeting Day(s) & Time(s):</i>	
<i>Credits:</i>	3.0
<i>Contact Hours:</i>	3.0 (1.5 Online, 1.5 In-Person)
<i>Instructor's Name:</i>	
<i>Office Hours & Location:</i>	
<i>OCC Email:**</i>	
<i>Additional Contact Information:</i>	

**Please use only Owens email for course communications.

Catalog description: Discusses the fundamentals of ultrasound physics, along with the principal underlying design and operation of the ultrasound equipment. Includes mathematics of ultrasound physics, properties of continuous and pulsed acoustic waves, effects of interfaces, the generation of ultrasound, and Doppler principles. Covers the types of different instrumentation, display modes, image artifacts, quality performance measurements, and bio-effects. Achieves didactic objectives through the use of images, supplemental reading materials, lecture, and class discussion.

Prerequisite/Corequisites: MIT 106, Admission into a Sonography program

Course Materials:

Miele, F. Ultrasound Physics and Instrumentation (6th ed.). Pegasus Lectures. 2021 ISBN13: 9781933250205

Supplemental/Optional: Edelman, Understanding Ultrasound Physics, 4th Edition, ESP, Inc., 2012.

*If a **print book, e-book, or access code** is required for class, you can access the Owens Community College e-Campus Bookstore by accessing the online link, called “Find Books” on the course schedule for each course section.*

What You Will Learn in the Course

Course Objectives:

This course will:

1. Discuss sound waves and their properties.
2. Discuss pulsed wave parameters and their relationships.
3. Describe the interaction of sound and different media.
4. Discuss different display modes, imaging types, imaging storage, and transducers.
5. Discuss hemodynamics and Doppler use.
6. Give students the opportunity to explain the physical principles of sonography in the laboratory setting.
7. Describe common ultrasound artifacts.
8. Discuss bioeffects associated with diagnostic ultrasound and ALARA.
9. Provide students with the information needed to successfully complete the ARDMS physics exam.

Student Learning Outcomes:

Students will:

Outcome	Where Assessed
1. Describe and define sound waves and properties.	Quizzes, Midterm, Comprehensive Final, Discussion Posts, Remote Activities, In-Class Activities
2. Understand pulsed wave parameters and their relationships.	Quizzes, Midterm, Comprehensive Final, Discussion Posts, Remote Activities, In-Class Activities
3. Explain the interaction of sound and different media.	Quizzes, Midterm, Comprehensive Final, Discussion Posts, Remote Activities, In-Class Activities
4. Recognize and identify different display modes, imaging types, imaging storage, and transducers.	Quizzes, Midterm, Comprehensive Final, Discussion Posts, Remote Activities, In-Class Activities
5. Describe hemodynamics and Doppler use.	Quizzes, Midterm, Comprehensive Final, Discussion Posts, Remote Activities, In-Class Activities
6. List and recognize the common ultrasound artifacts.	Quizzes, Midterm, Comprehensive Final, Discussion Posts, Remote Activities, In-Class Activities
7. Explain the bioeffects associated with diagnostic ultrasound and ALARA.	Quizzes, Midterm, Comprehensive Final, Discussion Posts, Remote Activities, In-Class Activities
8. Explain the physical principles of sonography in the laboratory setting.	Discussion Posts, Remote Activities, In-Class Activities

Technology, Lab, and File Requirements:

Microsoft Office 365

<https://www.owens.edu/office365/>

Respondus

<https://download.respondus.com/lockdown/download.php?id=139313370>

Academic Support

Disability Services Resource Center: If you have a disability or acquire one, you may be entitled to receive reasonable accommodations intended to assure you an equal opportunity to participate in and benefit from the program. To receive more information or to register for accommodations, please contact the Disability Resource Center at 567-661-7007, email disability@owens.edu, visit <https://www.owens.edu/disability/>, or stop by College Hall 124.

Tutoring Services: Owens Community College offers academic tutoring and assistance in a variety of subjects including: accounting, computing, economics, mathematics, science, and writing. For more information go to: <https://www.owens.edu/successcenters/>.

Counseling Services: Counseling Services provides assistance to students experiencing personal, educational, interpersonal/relationship, family, social, or psychological difficulties. If you feel you may benefit from this service, please contact them at counselingservices@owens.edu. More information is at <https://www.owens.edu/counseling/>.

Campus and Community Connections: The Center for Campus and Community Connections (College Hall 123) is a walk-in office created to provide retention support through resource stability initiatives and community connections. Go here for more information: <https://www.owens.edu/connection/> or contact connections@owens.edu

Owens Library: The Owens Library offers two locations (Toledo and Findlay) as well as online resources. For more information visit <https://www.owens.edu/library/>.

Students can find more information on campus resources, student support, student life, and security at this [link](#).

General Information

Student Code of Conduct: All students are expected to follow Owens Community College's Student Code of Conduct, which includes academic honesty, encompassing plagiarism. See the Board Policy for more information.

Anti-Discrimination and Harassment & Title IX/Sexual Misconduct: All students, faculty, and staff are expected to follow Owens Community College's Anti-Discrimination and Harassment Policy and the College's Title IX Policy/Sexual Misconduct Procedures and Guidelines. The College strictly prohibits and will not tolerate harassment, discrimination, intimidation, or hostile/offensive working or learning environments.

Religious Accommodations: A student seeking an accommodation for an absence permitted under Ohio's Testing Your Faith Act must provide the instructor with a written email notice with the specific dates for an absence, and must do so not later than fourteen (14) days after the first day of instruction. Alternative accommodations are not retroactive, and no academic penalty will be imposed for an absence under the policy*. The request for an alternative accommodation will be kept confidential. Students with questions about a religious accommodation under Ohio's Testing your Faith Act may contact the College's Office of Academic Affairs: provost@owens.edu The policy may be found on the Owens website: [3358:11-2-63 Accommodation](#) for a Student Absence for the Observance of Religious Beliefs and Practices Policy

Document Collection: Throughout the semester, your instructors may ask for a variety of assignments including tests and/or quizzes for student learning of institutional general education competencies or program assessment. Please save all your class materials until the end of the semester.

Classroom Admittance: OCC classes shall only be attended by the officially registered OCC students or perspective students, instructor of record, guest lecturer, or substitute. Visitors are not permitted to be in the classroom and should not be invited to attend or participate in the class. See [FERPA](#) regulations for more information.

Use of AI Tools: This course permits you to use artificial intelligence (AI) tools, such as chatbots, text generators, paraphrasers, summarizers, or solvers, to get guidance on assignments, as long as you do so in an ethical and responsible manner. Essentially, you can think of these tools as ways to help you learn but not to entirely create work for assignments like discussion

board posts, essays, presentation slides, and so on. AI is more like your tutor or TA, not a replacement for your independent thinking.

This means that you must:

- Not use AI tools to replace your own thinking or analysis or to avoid engaging with the course content.
- Cite or explain any AI tools you use. Provide the name of the AI tool, the date of access, the URL of the interface, and the specific prompt or query you used to generate the output.
- Be transparent and honest about how you used the AI tool and how it contributed to your assignment. Explain what you learned from the AI tool, how you verified its accuracy and reliability, how you integrated its output with your own work, and how you acknowledged its limitations and biases.

You are accountable for any mistakes or errors made by the AI tool. Always check and edit the output before submitting your work. If you discover any inaccuracies or inconsistencies in the output after submission, notify the instructor immediately and correct them as soon as possible. Using AI tools in an unethical or irresponsible manner, such as copying or paraphrasing the output without citation or transparency, using the output as your own work without verification or integration, or using the output to misrepresent your knowledge or skills, is considered a form of academic dishonesty and will result in a zero grade for the assignment and possible disciplinary action. If you have any questions about what constitutes ethical and responsible use of AI tools, please consult with the instructor **before** submitting your work.

Student Responsibilities & Instructor Expectations

Student Responsibilities:

- You are expected to attend weekly classes and arrive on time. If you are going to be absent, please email your instructor before class begins. Afterward, review the assignment calendar to see what was missed and reach out if you have questions.
- You are expected to fully engage with the course material and consistently put forth your best effort in lecture and lab.
- If you are unable to complete an assignment on time, contact your instructor as soon as possible to discuss your options.
- Email is the preferred method of communication outside of office hours. Please include clear and specific details in your message so your instructors can respond efficiently.
- You are encouraged to ask questions or request clarification. Unless we hear otherwise, we will assume you understand the material. Each class builds on previous concepts, so staying current is important.
- Show respect for your instructors, classmates, and the learning environment.
- You are expected to follow all guidelines and procedures outlined in the Sonography Department Procedure Manual.
- For technical issues related to Blackboard, contact the Owens Help Desk.

Instructor Expectations:

- The instructor will be respectful of your time and begin and end class on time. If any changes to class times occur, you will be notified by email.

- Your instructor’s goal is to review and return assignments that require student corrections within three days of submission. Assignments that do not require corrections or resubmission may take longer to be fully graded. If it has been more than three days and you are waiting on feedback for an assignment you believe may need revision, please email your instructor.
- Your instructor checks their email several times a day, but also has responsibilities outside of teaching this course. They will do their best to respond to your email with 24 hours on weekdays and within 72 hours on the weekends.
- Office hours are available outside of class time to support you with any questions or concerns related to the course. Please don’t hesitate to make use of this time.
- Your instructor welcomes and encourages questions.
- Teaching is a two-way process, and your instructor hopes to learn from your insights, questions, and feedback throughout the course.

How Grades are Determined and Major Assignments

Grading Procedure:

Grades will be calculated on the following scale.

93% and Above	A
85% to 92%	B
76% to 84%	C
60% to 75%	D
59% or Below	F

If the percentage earned is less than 76% for the course, the student will earn a grade of “**D or F**” for the course and will not be able to continue in the program.

The final grade for the course will be computed using the following weights.

Quizzes	15%
Midterm	20%
Comprehensive Final	25%
Discussion Posts	10%
Remote Activities	20%
In-Class Activities	10%

Total: 100%

****Please note that ½ point will be deducted from all homework, tests, and assignments for each spelling error. Using abbreviations will also result in a ½ point deduction. ****

Quizzes:

Quizzes will be given throughout the course and will be worth 15% of the course grade. Quizzes will cover material from the readings in the previous week and discussion/activities in-class.

Students must complete these prior to the due date. No late quizzes will be accepted without prior approval from the instructor.

Midterm:

A midterm will be given worth 20% of the course grade and will be taken in-class. Any student who is tardy to the exam will receive a five (5) point deduction on the exam. Any student, who is unable to take the exam as scheduled, must notify the course instructor at least 30 minutes prior to the due date in order to receive full credit. If no notification is received prior to missing the test a ten (10) point reduction will be taken from the score of the make-up test. The makeup test will be taken in the testing center within three (3) days of the original test date.

Comprehensive Final:

One comprehensive final exam will be given and will cover all content from the course. It will be worth 25% of the course grade and will be taken in-class. Any student who is tardy to the exam will receive a five (5) point deduction on the exam. The exam will still end at the scheduled time. Any student, who is unable to take the exam as scheduled, must notify the course instructor at least 30 minutes prior to the due date in order to receive full credit. If no notification is received prior to missing the test a ten (10) point reduction will be taken from the score of the make-up test. The makeup test will be taken within three (3) days of the original test date.

Note: Students who pass the course, but do not achieve a minimum score of 76% on the final exam will be required to attend a remediation and review session prior to retaking the final exam. While the original exam score will remain as the recorded grade, successful completion of the remediation and exam retake is required for the Sonography department to submit payment to the ARDMS for the SPI exam.

Discussion Posts:

After reviewing the assigned weekly materials, students will submit a discussion post demonstrating their understanding and engagement with the key concepts. Please see the rubric on Blackboard for grading. Late discussion posts will not be accepted. Discussion posts are worth 10% of the total course grade.

Remote Activities:

In the hybrid portion of this class, students will engage in remote activities designed to reinforce and expand upon in-class learning. Remote activities will be 20% of the course grade. Remote activities will cover the assigned topics and have two parts; a mini lecture video submission and a follow-up discussion post. See Blackboard for Remote Activity guidelines and a rubric for grading. All remote activities must be submitted by the due date. The mini lecture video portion of the remote activity will be accepted at half credit up to 24 hours past the due date. Beyond 24 hours after the due date, the mini lecture video will not be accepted unless given prior approval from the instructor. Late follow-up discussion posts will not be accepted and will be assigned a 0 for the peer reflection portion of the assignment.

In-Class Activities:

Attending class and being an active learner will elevate student success in the course. Most weeks there will be an in-class activity that will be completed in groups and reviewed as a class. The assignment must be submitted on Blackboard by midnight on the day of class in order to receive points for in-class activities. No late submissions will be accepted without prior approval from the instructor. Any student who is unable to attend class for the week must notify the course instructor at least 30 minutes prior to the start of class to be eligible for a make-up assignment. If no notification is received, then the student will forfeit the in-class participation points from the activity for the week. In-class activities are worth 10% of the total course grade.

Online Extras (Formative Assessment):

Supplemental online exercises and conceptual questions are embedded throughout the assigned readings. Students are encouraged to access the Online Extras Portal within their Pegasus Lectures account to ensure all activities are completed. These exercises serve as formative assessments designed to help reinforce your understanding of key concepts. While they are not graded, you are required to submit confirmation of completion in the designated area on Blackboard to stay accountable and track your progress.

Assignment Calendar

Week	Dates	Course Outline/Prep **All Chapter readings - Level 1 and Level 2 material only	Activities/Assignments	Due Date	SLO
Pre-Class		Read Chapter 1 (review) Read Chapter 2 Watch Lecture Materials Complete Online Extras	Ch 2 Discussion Post		1, 2, 3
Week 1	In-Person	Syllabus Review Waves	In-Class Activity 1		1, 2, 3
	Remote	Read Chapter 3 Watch Lecture Materials Complete Online Extras	Ch 1 & 2 Quiz Ch 3 Discussion Post		1, 2, 3 1, 2, 3
Week 2		No Class – HOLIDAY WHEN NEEDED			
	Remote	Read Chapter 4 Watch Lecture Materials Complete Online Extras	Ch 4 Discussion Post Ch 3 & 4 Remote Activity (Video)		4 1-4
Week 3	In-Person	Attenuation Pulsed Wave Operation	In-Class Activity 2		1-4
	Remote	Read Chapter 5 Part I & II Watch Lecture Materials Complete Online Extras	Ch 3 & 4 Remote Activity (Discussion) Ch 3 & 4 Quiz Ch 5 Discussion Post Ch 5 Remote Activity (Video)		1-4 1-4 4 4
Week 4	In-Person	Transducers	In-Class Activity 3		4
	Remote	Review	Ch 5 Remote Activity (Discussion) Ch 5 Quiz		4 4
Week 5	In-Person	Review	In-Class Activity 4		1-4
	Remote	Read Chapter 6, Part I Watch Lecture Materials Complete Online Extras	Ch 6 Part I Discussion Post (Video) Ch 6 Part I Remote Activity		4 4

Week 6	In-Person	System Operations	In-Class Activity 5 9/29	4
	Remote	Read Chapter 6, Part II Watch Lecture Materials Complete Online Extras	Ch 6 Part I Remote Activity (Discussion)	4
			Ch 6 Part I Quiz	4
			Ch 6 Part II Discussion (Video) Ch 6 Part II Remote Activity	4 4
Week 7	In-Person	System Operations	In-Class Activity 6	4
	Remote	Review	Ch 6 Part II Remote Activity (Discussion) Ch 6 Part II Quiz	4 4
Week 8	In-Person 10/13	Review	In-Class Activity 7	1-4
	Remote	Review		
Week 9	In-Person	Midterm		1-4
	Remote	Read Chapter 7 Watch Lecture Materials Complete Online Extras	Ch 7 Discussion (Video) Ch 7 Remote Activity	5 5
Week 10	In-Person	Doppler	In-Class Activity 8 (Lab)	5, 8
	Remote	Read Chapter 12 Read Chapter 13 Watch Lecture Materials Complete Online Extras	Ch 7 Remote Activity (Discussion)	5
			Ch 7 Quiz	5
			Ch 12 & 13 Discussion Ch 12 & 13 Remote Activity (Video)	5 5
Week 11	In-Person	Fluid Dynamics Hemodynamics	In-Class Activity 9 (Lab)	5, 8
	Remote	Read Chapter 8 Watch Lecture Materials Complete Online Extras	Ch 12 & 13 Remote Activity (Discussion) Ch 12 & 13 Quiz	5 5
			Ch 8 Discussion Ch 8 Remote Activity (Video)	6 6
Week 12	In-Person	Artifacts	In-Class Activity 10	6
	Remote	Read Chapter 20 Complete Online Extras	Ch 8 Remote Activity (Discussion) Ch 8 Quiz	6 6
			Ch 20 Discussion Ch 20 Remote Activity (Video)	1-8 1-8

Week 13	In-Person	Image Optimization	In-Class Activity 11 11/17	1-8
	Remote	Read Chapter 9 Read Chapter 10 Read Chapter 11 Watch Lecture Materials Complete Online Extras	Ch 20 Remote Activity (Discussion) Ch 20 Quiz Ch 9, 10, 11 Discussion Ch 9, 10, 11 Remote Activity (Video)	1-8 1-8 4, 7 4, 7
	In-Person	Bioeffects Contrast & Harmonics Quality Assurance	In-Class Activity 12	4, 7
	Remote	Review	Ch 9, 10, 11 Remote Activity (Discussion) Ch 9, 10, 11 Quiz	4, 7 4, 7
Week 15	In-Person	Review	In-Class Activity 13	1-8
	Remote	Review		
Week 16	In-Person	Final Exam		1-8

Disclaimer: The instructor reserves the right to amend this syllabus as deemed necessary and will communicate such amendment to the students in the course. Please note that while unlikely, there is a possibility courses might need to change the delivery method due to external issues like public health concerns, weather issues, etc. If this happens, the college will communicate any changes via email and/or other communication methods.